Product Technical Specification

Satellite Mobility (LCPA) Agreement

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Version	Description	Effective Date
2.0	First issued version of Satellite Mobility (LCPA) Agreement 2	Start Date

Roadmap

A roadmap describing the structure of this Product Technical Specification follows for the assistance of Customer.

1 Scope and purpose

1.1 Purpose

This Product Technical Specification sets out the technical specifications for the **nbn**® Satellite Mobility Product.

1.2 Scope

1.2.1 Scope

Sections 2 to 7 of this Product Technical Specification describe the features of the **nbn**® Satellite Mobility Product as offered by **nbn**.

As set out in the Product Description the **nbn**® Satellite Mobility Product is comprised of four Product Components:

- Mobility Network-To-Network Interface (M-NNI);
- Mobility Fleet Virtual Circuit (MF-VC);
- Mobility Beams Virtual Circuit (MB-VC); and
- Mobility Beams Interface (MBI).

These Product Components are further described in this document.

1.3 Definitions

Capitalised terms used but not defined in this Product Technical Specification have the meaning given in the Dictionary.

If a capitalised term used in this document is not defined in the Dictionary, then that term has the ordinary meaning commonly accepted in the industry.

2 Introduction

2.1 Service Type Availability

nbn® Satellite Mobility Product supports the flexible delivery of unicast data services. The **nbn**® Satellite Mobility Product uses a logical, Layer 3 circuit that enables access to a variety of higher-level data applications including internet access and tunnelling protocols.

The **nbn**® Satellite Mobility Product is targeted towards “best effort” applications.

2.1.1 Service Addressing

The **nbn**® Satellite Mobility Product provides logical connectivity between the M-NNI and a Customer’s Mobile Terminal accessing its associated MB-VC at the MBI using the IP address range of the unicast data service.

Routing of the unicast data services will be configured as an IP spoke within a hub-and-spoke topology, sending all upstream traffic received from a Mobile Terminal accessing its associated MB-VC at the MBI to the M-NNI.

The **nbn**® Satellite Mobility Product supports the entire IPv4 public address range. If Customer wishes to use a private IPv4 address space, Customer must coordinate with **nbn**. The **nbn**® Satellite Mobility Product supports only IP version 4 (IPv4).

It is the responsibility of Customer to manage allocation of IPv4 addresses and associated network parameters. Customer must provide DHCP server infrastructure and assign the following parameters:

- IP Address (IPv4);
- Subnet Mask;
- Default Gateway; and
- DNS server (if required by Customer).

2.1.2 Bandwidth Profile Parameter Considerations

This section describes the bandwidth profile parameters used for the **nbn**® Satellite Mobility Product.

2.1.2.1 Calculation of Information Rate

The CIR is enforced at the M-NNI between the Customer Network and the Satellite Network.

Customers must use a maximum data payload MTU of no greater than 1574 bytes. There is no restriction on minimum payload size.

2.1.2.2 Committed Burst Size (CBS)

The Committed Burst Size (CBS) is set by **nbn** and cannot be modified.

The CBS is used by the policing functions of the Satellite Network at ingress to the Satellite Network to determine whether a stream of ingress data complies with the subscribed CIR. Customer is responsible for ensuring that all ingress traffic is shaped to comply with the CIR/CBS as specified before presentation to the M-NNI. CBS values are aligned with the Network Interface Specification – NNI issued by **nbn**.

2.1.3 Traffic Contention and Congestion Management

Customer may control the End User experience of applications using the **nbn**® Satellite Mobility Product by managing capacity on the MF-VC, subject to the conditions set out in the Product Description. The contention level may be used by Customer to independently control the economics and operation of their mobility service and to ensure a level of contention appropriate for each respective higher-layer application.

3 Mobility Network-to-Network Interface (M-NNI)

Section 1 of the Product Description describes the M-NNI Product Component. This section provides further product-level specification of the M-NNI, including the requirements for interfacing the Customer Network to the Satellite Network.

3.1 Overview

Customer will interface with the **nbn**® Satellite Mobility Product at M-NNI located at **nbn**'s POI at Eastern Creek, NSW.

The Customer will interface its network to the Satellite Network via either:

- 1Gbps LX type connection(s); or
- 10Gbps LR or ER type connection(s).

Customer may request a redundant connection of the same profile during the M-NNI order.

Customer's Network equipment is required to form a Border Gateway Protocol (BGP) peering relationship with the Satellite Network. The following BGP configurations will be coordinated with the Customer as a part of the on-boarding process:

- Autonomous-system (AS) number;
- KeepAlive Timer;
- Hold-Timer; and
- Authentication algorithm type and associated key(s).

Customer must use the service addressing policies set out in section 2.1.1

An M-NNI ordered by Customer is specific to that Customer.

3.2 M-NNI Interface Rate

The interface rate of the M-NNI is either 1 Gbps (1000BaseLX) or 10 Gbps (10GBaseLR or 10GBaseER).

3.3 M-NNI Redundancy Mode

The M-NNI may be ordered and configured with support for dual interface (both active-active).

3.4 MF-VC Support

An M-NNI can support multiple MF-VCs up to the maximum interface rate of the applicable M-NNI Bearer and the limits described in the Product Description.

3.5 Class of Service Support

Any priority tagging applied by the Customer will be disregarded at the M-NNI.

4 Mobility Fleet Virtual Circuit (MF-VC)

4.1 Overview

An MF-VC is a Layer 3 IP-based connection dimensioned with a specific, configured amount of bandwidth ordered by Customer which can be used to deliver a higher-layer service (or number of services) to a range of MB-VCs.

An MF-VC Product Component has a single variant:

- 1:1 MF-VC – required for 1:1 MB-VC unicast services delivered to Customer Network at the MBI.

An MF-VC ordered by Customer is specific to that Customer.

4.2 MF-VC Scalability

Customer should consider MF-VC scalability in conjunction with contention. Customer may control End User experience through contention applied by dimensioning of MF-VC capacity subject to the conditions set out in the Product Description.

4.3 MF-VC Bandwidth Profile Availability

The available unicast 1:1 MF-VC bandwidth profiles comprise the symmetrical upstream/downstream bandwidth profiles set out in the Product Description.

4.4 MB-VC Support

An MF-VC can support multiple MB-VCs.

5 Mobility Beams Virtual Circuit (MB-VC)

5.1 Overview

The MB-VC is a Layer 3 IP-based connection used to carry Customer traffic between the MF-VC and the MBI where Mobile Terminals that are associated with that MB-VC interface with the Satellite Network. The MB-VC determines the attributes of the service being provisioned to a Mobile Terminal accessing the Satellite Network at the MBI.

The **nbn**® Satellite Mobility Product MB-VC Product Component has one variant:

- Unicast 1:1 MB-VC – required for unicast data applications using the MBI.

The MB-VC is scalable in capacity up to the physical limits of the underlying access network technology.

6 Mobility Beams Interface (MBI)

6.1 Overview

The Mobility Beams Interface (MBI) is the air interface where Customer traffic for all Mobility Beams is handed over from the Satellite Network to the Customer Network.

The MBI shares the same satellite carriers as those used in connection with **nbn**® Ethernet (Satellite) and operates over a number of such satellite carriers, collectively referred to as media access control (MAC) Domains. A MAC Domain consists of a single forward link and a collection of return link carriers.

The physical layer of the MBI includes a forward link physical layer waveform closely mirroring the industry standard ETSI DVB-S2 waveform standard and utilising adaptive coding and modulation (ACM) to achieve high availability while maintaining spectral efficiency; and a return link physical layer utilising a collection of high performance forward error correction (FEC) coding options operated over a variety of symbol rates ranging from 625 ksps to 20 Msps.

The MAC layer of the MBI operates with the same WiMAX-based MAC layer interface standards used in connection with **nbn**® Ethernet (Satellite). The MBI allows Mobile Terminals to perform all MAC layer exchanges and transactions as those supported in the **nbn**® Ethernet (Satellite), and in addition supports enhanced MAC Layer protocols that enable the **nbn**® Satellite Mobility Product to perform near seamless handovers of MTs from one Mobility Beam to another while the MT is in motion. The MBI also allows Mobile Terminals to provide properly formatted Navigation Data Reports (NDR) at regular intervals and/or on-demand when so instructed by the network. NDR messaging conveys position, speed, bearing and other information about the Mobile Terminal condition that is necessary for efficient and timely Mobility Beam handover operations.

6.2 Interfacing with the MBI

Customer may access the **nbn**® Satellite Mobility Product at the MBI by operating a Mobile Terminal which, in accordance with section 2.1.3 of the Operations Manual has been accredited to:

- have the necessary specifications to interface with the MBI; and
- not interfere with the Satellite Network or other satellite networks.

Customer must not submit a prospective Mobile Terminal for Approval in accordance with section 2.1.3 of the Operations Manual unless the prospective Mobile Terminal:

- achieves a minimum gain-to-noise-temperature ratio (G/T) in the Ka-band of 12.0 dB/K (excluding radome losses); and
- has received all applicable regulatory approvals, including any type certificates, for installation on the Supported Commercial Passenger Aircraft to which Customer proposes to supply a Customer Product.

Customer must, additionally, ensure that any Mobile Terminal used to access the **nbn**® Satellite Mobility Product at the MBI is a Listed Mobile Terminal in accordance with section 2.1.4 of the Operations Manual. Customer must not attempt to access, and **nbn** is not required to enable access to, the MBI by means of a Mobile Terminal that is not a Listed Mobile Terminal.

nbn does not, by Approving or listing a Mobile Terminal, give any warranty or representation that it is fit for purpose.

7 Dependencies

nbn supplies the **nbn**® Satellite Mobility Product by means of the Satellite Network. It is subject to capacity availability.

7.1 Supported Service Types

Layer 3 Unicast data services.

7.2 M-NNI Availability

Available only at **nbn**'s POI at Eastern Creek, NSW.

7.3 MF-VC Availability

Available only at **nbn**'s POI at Eastern Creek, NSW.

7.4 MBI Availability

MBI may be supplied across one or both satellites (satellite 1A and satellite 1B) depending on aggregate demand for MF-VC capacity by Customer and Other Customers. The default satellite available to Customer is satellite 1B. If the aggregate demand for MF-VC capacity by Customer and Other Customers is greater than or equal to 1 Gbps, the MBI will be made available on both satellite 1A and 1B.

Note: When the MBI is switching Mobility Beams between satellite 1A and 1B, there will be a brief service interruption. This is not an Outage or a Service Fault.